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Studies on Permo-Trias of Madagascar. 3. The decapod crustaceans of the Ambilobè region (NW Madagascar)

Summary — A large decapod crustaceans sample from the Lower Triassic of Madagascar is here described. The specimens, coming from the outcrops S-SW of the village of Ambilobé (NW Madagascar), represent the most ancient, significant decapod crustacean assemblage known to date. The specimens belong to the infraorder Penaeidea de Haan, 1849 within which the new genus *Ifasya* is created, to which the species *I. straeleni* n. sp. and *I. madagascariensis* (Van Straelen, 1933) are assigned.

Résumé — Études sur le Permotrias du Madagascar. 3. Les crustacés décapodes de la région d'Ambilobé (NO Madagascar).

On analyse l'ensemble faunique des crustacés décapodes du Triassic inférieur du Madagascar. Les exemplaires, qui proveniennet d'affleurements situés à S-SO de la ville d'Ambilobé (NO Madagascar) représentent l'ensemble faunique des crustacés décapodes plus ancien jamais découvert. Les exemplaires examinés appartiennent à l'infra-ordre Penaeidea de Haan, 1849 dans le milieu duquel le nouveau genre *Ifasya* a été fondé; à le nouveau genre viennent attribuées les espéces *I. straeleni* n. sp. et *I. madagascariensis* (Van Straelen, 1933).

Riassunto — Studi sul Permotrias del Madagascar. 3. I crostacei decapodi della regione di Ambilobé (Madagascar nordoccidentale).

Viene analizzata un'ampia collezione di crostacei decapodi del Triassico inferiore del Madagascar. Gli esemplari, provenienti dagli affioramenti a S-SO della città di Ambilobé (NO Madagascar), rappresentano il complesso faunistico a crostacei decapodi più antico finora conosciuto. Gli esemplari esaminati appartengono all'infraordine Penaeidea de Haan, 1849 nell'ambito del quale è stato istituito il nuovo genere *Ifasya* al quale vengono ascritte le specie *I. straeleni* n. sp. e *I. madagascariensis* (Van Straelen, 1933).

Key words: Crustacea, Decapoda, Triassic, Madagascar

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Introduction

The fossiliferous levels of Permotriassic marine sediments located S-SW of the village of Ambilobé (Fig. 1), about 150 Km SW of Diego Suarez (Antseranana), are known since the beginning of this century.

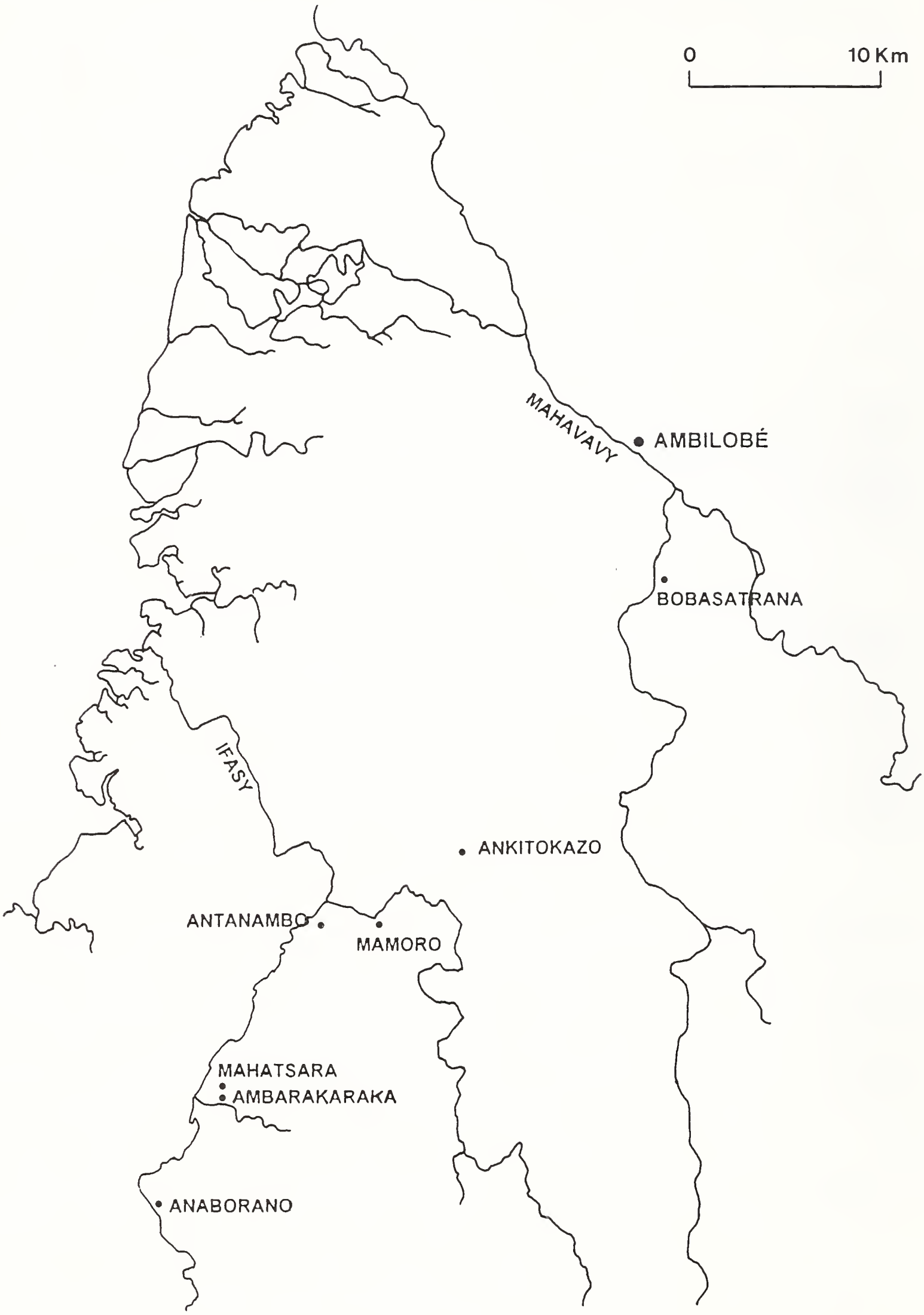

Fig. 1 – Location of outcrops in the N. W. Madagascar.

This paper deals with the description of a large sample of fossil decapod crustaceans of the Lower Triassic of the Ambilobé region (NW Madagascar). The fossiliferous rocks are included into a sedimentary succession of permotriassic age, forming a discontinuos, about 120 Km long band oriented SW-NE; the band of marine sedimentary rocks is placed in a depression included between two cuestas, formed by the prepalaeozoic crystalline basement at NE, and by non-fossiliferous continental Middle and Upper Triassic sandstones (Isalo) at SW. According to Besairie (1932, 1972), the Permotriassic succession in the region is the following (from bottom to top):
1 - Neopermian (*Productus, Spirifer* and *Xenaspis* beds)
2 - Neopermian (*Cyclolobus* and *Xenaspis* beds)
3 - Lower Eotrias (*Claraia* and fish beds)
4 - Middle Eotrias (fish and ammonite beds)
5 - Upper Eotrias (Iraro shales at W and Barabanja *Flemingites* beds at E)
6 - Isalo continental sandstones.

The thickness of the various members of the series is, according to Besairie (1972), highly variable. Permian strata are evaluated to be about one hundred metres thick, the marine Lower Triassic series varies from 600 m in the western parts of the basin, in the Ankitokazo area, to 1200 m in the Andavakoera Massif region, and to just 300 m in the Barabanja basin, at the eastern limits of the sedimentary band.

The famous faunal assemblage comprising invertebrates (ammonites, pelecypods, holothuroids, annelids, decapod crustaceans etc.) and vertebrates (mostly fishes, but also rare amphibians), is found in the most western outcrops of the band of sedimentary rocks, roughly included between the small villages of Anaborano Ifasy at SW and Bobasatrana at NE. The first discoveries of fossils in the region took place at the beginning of this century, during geological prospectings aimed to the search of gold deposits, and the first scientific paper was by Douvillé (1910). Since then many studies were carried out on invertebrate fauna, mainly dealing with ammonites and pelecypods, but also with nautiloids, crustaceans (decapods and thylacocephalans), echinoderms and polychaete annelids; among these Vaillant-Couturier Treat (1933), Van Straelen (1933), Collignon (1933, 1934), Alessandrello (1990) and Arduini (1990). Also vertebrates were the subject of many researches, both concerning fishes (Priem (1924), Moy-Thomas (1935), Piveteau (1927, 1934, 1946), Lehman (1948, 1952, 1953, 1956), Beltan (1968) and Olsen (1984), and amphibians (Piveteau (1936, 1938, 1946) and Lehman (1955, 1958, 1960, 1963, 1966)).

The present work is part of a programme of studies started by the Museo di Storia Naturale di Milano on the material of its own collection of the Lower Triassic fossils of the Ambilobé region. The material was partly gathered during a mission in 1989 to which the authors and Mr. Giovanni Pasini took part, and partly gathered in the previous years by Mr. Giovanni Pasini himself.

Fossiliferous outcrops

Fossils are preserved inside silicatic nodules rich in iron oxyde, which are found into a formation, about 350 m thick, of marly shales alternated to sandstones (Besairie (1972)). The fossiliferous outcrops have a limited

Fig. 2 – Section of the beds.

extension, since the region is covered by an open secondary forest, often interrupted by vegetated clearings and with a lateritic soil.

The exposed sections have a maximum thickness of just few metres (Fig. 2) and it is impossible to correlate them each other; moreover the fossiliferous nodules are not very abundant inside the shales (Fig. 3). It is therefore very hard to carry out detailed stratigraphical subdivisions. For instance it is difficult to verify the subdivision into «Lower Eotrias – *Claraia* and fish beds» and «Middle Eotrias – fish and ammonite beds» by Besairie (1972); during our mission we were able to ascertain that in the visited outcrops (located near Ambarakaraka, Mahatsara, Antanambo, Mamoro, Ankitokazo, Ambatolokobé) the decapod crustaceans, the ammonites, the fishes and the pelecypods of the genus *Claraia* are always associated even in the same nodule.

The outcrops usually originate from the intervention of local people, burning small parts of the forest in order to obtain rice-growing ground; on the bare-laying ground the fossiliferous nodules – free by erosion from the most tender matrix surrounding them – accumulate in preferential places, transported by the superficial stream waters (Fig. 4).

The existence of the fossils is well known to the populations of the little villages and perceived as a natural fact, of which however the cultural tradition of the area lacks an explanation. Nevertheless the local dialect has well defined names for the fossiliferous nodules according to their possible contents, which can sometime be ascertained from the shape and the size of the nodule itself. The small subspherical nodules containing decapod crustaceans are in fact called *vato makamba* (from *vato*=stone and *ma-*

Fig. 3 – Nodule within the beds.

Fig. 4 – Distribution of the nodules on the ground.

kamba=shrimp, therefore shrimp-stone), while the bigger, elongate and flatnodules are called *vato-loko* (*loko*=fish), that is fish-stone.

The fossils are also mentioned in the local toponomy: Ambatolokobé is the name of a small irregular-shaped esplanade on the ridge of a hillock 150 m SW of the small village of Antana-mitàrana, where it is possible to find a high number of fossiliferous nodules; in the local Malagasy dialect «*ambato*» means «place with stones», «*loko*» – as already seen – means «fish», «*-bé*» is a suffix indicating «abundance». Ambatolokobé therefore means «the place with many fish-stones», that is the site par excellence with fossiliferous nodules.

Fossil decapods

The only previous description of fossil decapods from the Lower Triassic of Madagascar is due to Van Straelen (1933) who described two incomplete specimens from the Ambilobé region, from the collection of the Museum National d'Histoire Naturelle of Paris, ascribing them to the species *Antrimpos madagascariensis.*

The present study is based on a sample of 418 specimens, 88 of which cannot be determined. The specimens were found in the outcrops surrounding the villages of Bobasatrana (182 specimens), Mamoro (56 specimens), Ambarakaraka (94 specimens), Antanambo (77 specimens). The original locality of nine specimens cannot be determined. The decapods are preserved more or less flattened inside mostly subellipsoidal nodules, 1 to 3.5 cm thick

and 2 to 11 cm long. The shrimps can be found inside a nodule as single specimen, especially in the case of the biggest ones, or associated in more specimens, or — more rarely — on the outer surface of highly flattened nodules. They consist mostly of the outer model, and often preserve the remains of the internal structures, such as the mandible and the thoracic somites.

Acronyms - MSNM: Museo di Storia Naturale di Milano; MNHN: Museum National d'Histoire Naturelle, Paris

Abbreviations

R - rostrum
b - hepatic groove
a - branchiocardic groove
sb - hepatic spine
sgo - gastro-orbital spine
sa - branchiocardic spine

Systematics

Infraorder Penaeidea de Haan, 1849
Superfamily Penaeoidea Rafinesque, 1815
Family Penaeidae Rafinesque, 1815

Genus *Ifasya* nov.

Derivatio nominis: from the Valley of the Ifasy river, SW of Ambilobé (NW Madagascar), where many of the fossiliferous sites occur.

Type species: Ifasya straeleni n.sp.

Type locality: Ambilobé region, NW Madagascar.

Geological age: Griesbachian (Scythian, Lower Triassic).

Diagnosis. Subrectangular carapace; long rostrum with or without subrostral middle tooth; strong hump at the base of the rostrum; deep hepatic groove and weak branchiocardiac groove; gastro-orbital, hepatic and branchiocardiac spines present; pereiopods I-III chelate; very developed propodus of pereiopod III; strongly elongate tergite VI; triangular telson with a pointed distal extremity.

Discussion. The abundant sample at our disposal allows a more accurate and detailed analysis of the Malagasy decapods than the one that Van Straelen (1933) was able to carry out, owing to the poorness of the material at his disposal (two incomplete specimens).

Van Straelen (1933) ascribed his specimens to the genus *Antrimpos* Münster, 1839. Nevertheless, our specimens show some features leading us to the separation of such forms from the genus *Antrimpos* Münster, 1839. They lack the orbito-antennal and gastro-frontal grooves, while they have a branchiocardiac groove, absent in *Antrimpos* Münster, 1839; propodus of pereiopods I-III is much stronger than in *Antrimpos* Münster, 1839 respect to the body size in the Malagasy forms, which have also exopodite devoid of a diaeresis and the weakly developed pleopods; moreover the carapace lacks

the antennal spine, while they have a hepatic, branchiocardiac and gastro-orbital spines. These are the main morphological differences found in the examined specimens, which allow us to assigne them to a new genus *Ifasya.*

We have ascribed to the genus *Ifasya* nov. the new species *I. straeleni* n.sp. and the species *I. madagascariensis* (Van Straelen, 1933).

These species are both assigned to the same genus on the basis of some common features, such as the marked dorsal hump at the base of the rostrum, the presence of the hepatic and branchiocardiac grooves, the gastro-orbital, hepatic and branchiocardiac spines and the presence of a spine in the posterior third of the dorsal margin of the carapace.

Nevertheless the species *I. straeleni* n.sp. and *I. madagascariensis* (Van Straelen, 1933) essentially differ for two features: *I. straeleni* n.sp. has a long rostrum lacking both suprarostral and subrostral teeth, while *I. madagascariensis* (Van Straelen, 1933) has a long rostrum, with a subrostral median tooth; in *I. straeleni* n.sp. the chela of pereiopod III has a dactylus longer than index, while in *I. madagascariensis* (Van Straelen, 1933) dactylus and index of the chela of pereiopod III have the same length.

Ifasya straeleni n.sp.
Figs. 5, 6, 7, 10, 11, 12, 13, 14, 15, 16

Derivatio nominis: dedicated to Prof. Victor Van Straelen, who first studied the decapod crustaceans from Lower Triassic of Madagascar.
Holotype: MSNM i9421.
Paratypes: MSNM i9317, i9459, i9460, i11141, i11203.
Type locality: Ifasy Valley, Ambilobé Region, NW Madagascar.
Geological age: Griesbachian (Scythian, Lower Triassic).

Diagnosis. Subrectangular carapace; long rostrum, lacking both suprarostral and subrostral teeth; marked dorsal hump at the base of the rostrum; spine in the posterior third of the dorsal midline of the carapace; deep hepatic groove and weak branchiocardiac groove; gastro-orbital, hepatic and branchiocardiac spines present; pereiopods I-III chelate; strongly elongate pereiopod III; tergite VI rectangular; triangular telson with a pointed distal extremity.

Material. 150 specimens, in a fairly good state of preservation, were found in different outcrops; Ambarakaraka (57); Antanambo (37); Bobasatrana (17); Mamoro (32). Seven specimens lack the place of origin.

The description of the species is particularly based on the following specimens:
MSNM i9317, i9421, i9459, i9460, i11141, i11203, i11230, i11249

Description. Small elongate penaeid, with thin finely tuberculate carapace, 2.5 to 6.5 cm in length.

Carapace. The carapace (Fig. 5), in lateral view, is subrectangular in outline, with the ventral margin rising slightly in the anterior third. The

dorsal margin has a straight trend and it has a forward projecting strong spine in the posterior third. The dorsal margin extends into a long, thin rostrum with pointed distal extremity and lacking suprarostral and subrostral teeth. At the base of the rostrum a marked dorsal hump is evident. The posterior margin, slightly convex in the lower third, is strengthened by a thin marginal carina. The ventral margin has a curvilinear trend. The ocular incision is narrow and shallow. Weak antennal and pterigostomial angles are present. On the carapace there are the deep hepatic groove, the weak branchiocardiac groove and the gastro-orbital, hepatic and branchiocardiac spines.

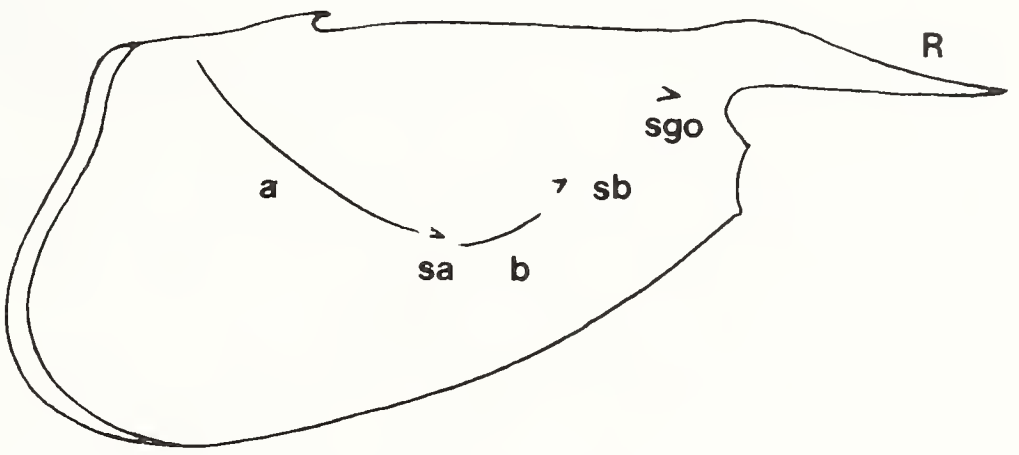

Fig. 5 — *Ifasya straeleni* n.sp., carapace reconstruction, line drawing.

Abdomen. It is well preserved in all the specimens. Tergites I-V are subrectangular in outline and increasing in length. The posterior margin of tergites I-III is straight, while that of tergites IV-V is posteriorly projecting. Tergite VI is rectangular in outline, its length is twice as much as the height, and it has a thin carina running near the ventral margin. The telson is triangular in outline, with pointed distal extremity, and its length equals that of tergite VI. The uropods are about 1/3 longer than the telson. The exopodite is crossed by a thin longitudinal median carina; the latter joins the external lateral margin creating a spine. The endopodite is crossed by two thin longitudinal lateral carinae.

Cephalic appendages. These are partly preserved. Only fragments of the flagella of the antennulae are present in some specimens. The scaphocerite comprises a large lamina rounded at the distal extremity and bearing a spine on the external margin. The scaphocerite is articulated to a rectangular basicerite. A thin flagellum, which total length is not evident, articulates to the carpocerite.

Thoracic appendages. While pereiopods are partly preserved in almost all the specimens, the 3rd maxilliped is never present. Pereiopods I-III are chelate and increasing in length. Pereiopod III is strongly elongate and merus and propodus are extremely thin and elongate and equal in length. On the contrary carpus is short and stocky, and its length is about 1/3 that of the other articula. Propodus of pereiopod III has the same length as the carapace. Dactylus and index of the chela are thin and slightly bent at the

distal extremity, with a dactylus longer than index. Pereiopods IV-V are short, thin and with a terminal dactylus.

Abdominal appendages. The pleopods are preserved only in few specimens. Each pleopod comprises a subrectangular sympodite to which two short multiarticulate flagella are articulated.

Discussion. In this species also 50 small-sized specimens (2.5 to 5 cm in length) are included, with a peculiar fossilisation position of the carapace. Even though all the specimens are in lateral view, most of them show an open carapace, almost dorsally flat. The fact that the carapace is open was deduced by the grooves and the spines, which are symmetrical on both sides (Fig. 7). It is possible to observe that the apparent median carina that is evident in Fig. 7 is just the spine located on the posterior third of the dorsal margin of the carapace, that the groove originating from the posterior third is the branchiocardiac groove, and that the spines are respectively the hepatic and the antennal spines, symmetrical on each side. In the large specimens the antennal spine is not evident.

These specimens are assigned to the species *I. straeleni* n. sp., on the base of these features, but also for the long rostrum lacking suprarostral and subrostral teeth, for pereiopod III strongly elongated, with propodus and merus of the same length, for the chela of pereiopod III with dactylus and

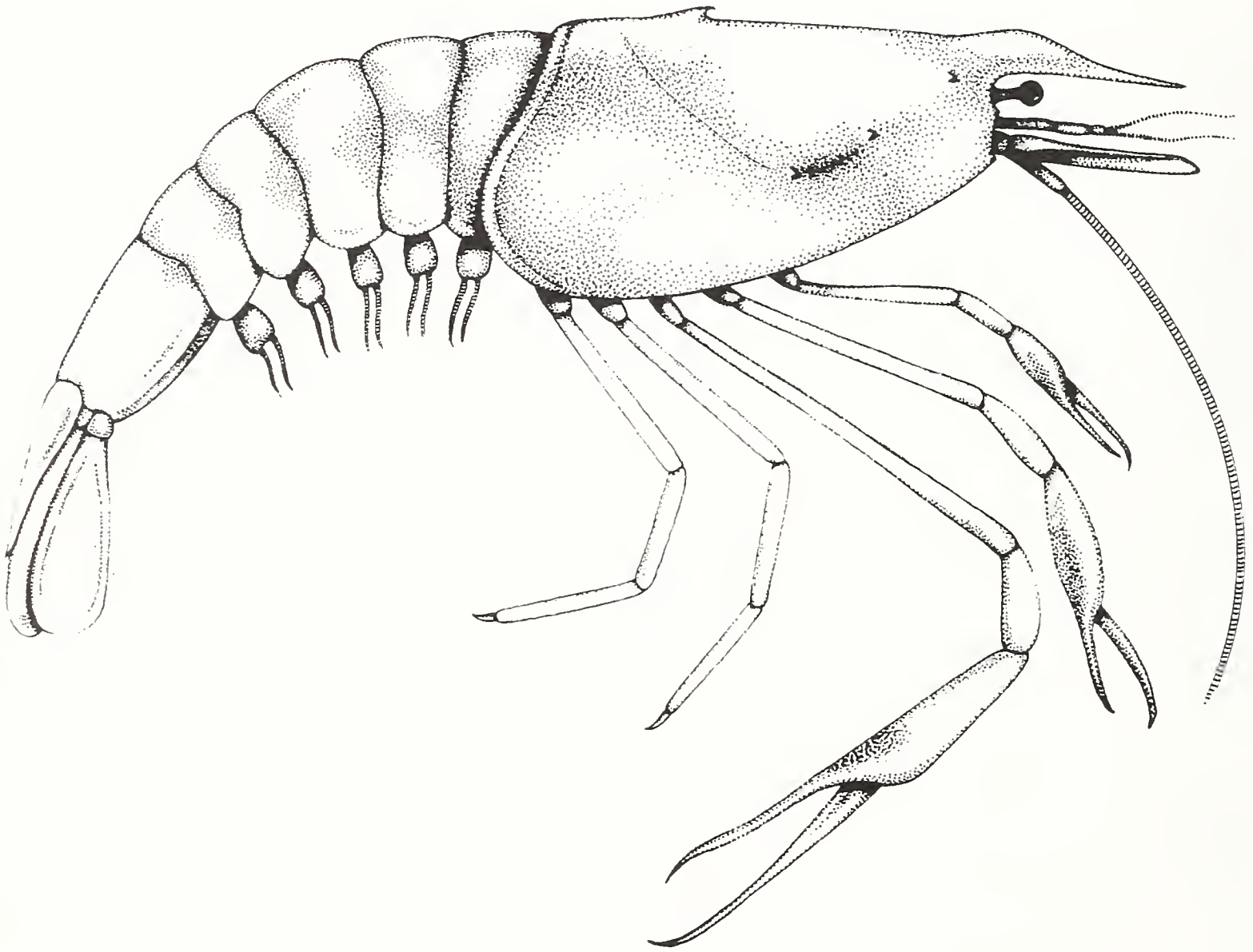

Fig. 6 — *Ifasya straeleni* n.sp., reconstruction.

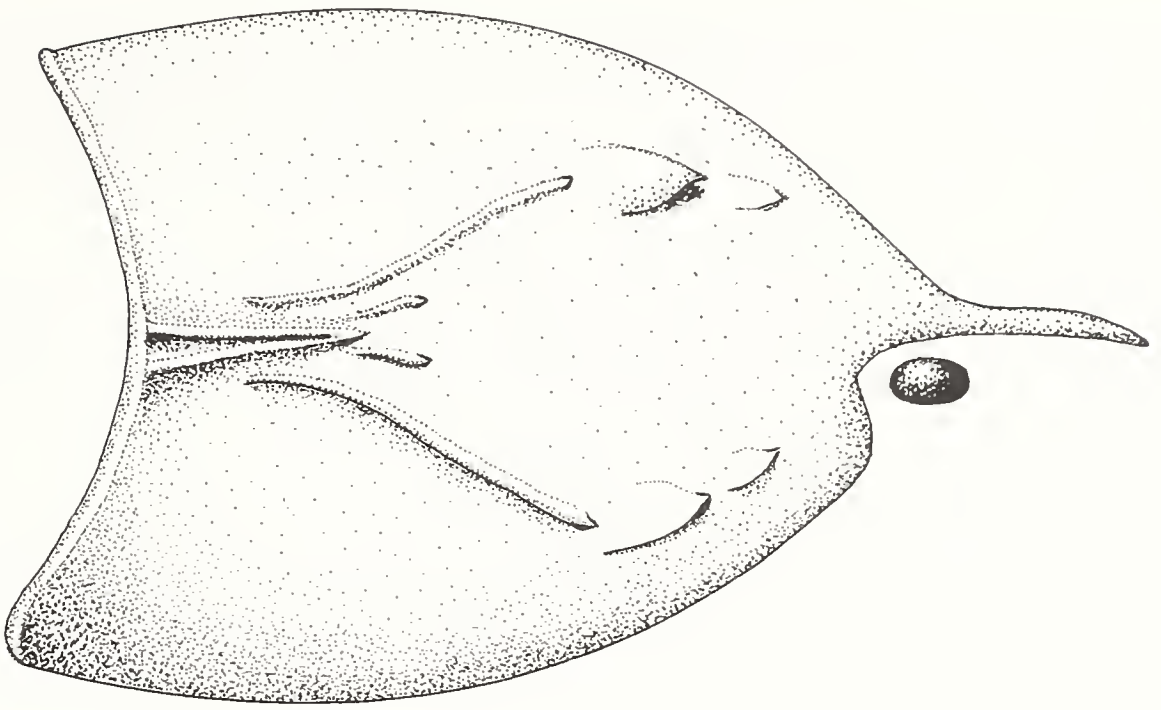

Fig. 7 — *Ifasya straeleni* n.sp., open carapace of the small specimens, line drawing.

index bent at the distal extremity, for the presence of the branchiocardiac and hepatic grooves, and finally for the presence of the hepatic and branchiocardiac spines. We therefore believe that the small specimens represent ontogenetic stages previous to those represented by the large specimens. Such hypothesis is confirmed also by the morphometric measures. The ratio length of the chela/length of the carapace is constant in the specimens of all sizes, as well as the size of tergite VI and of the carapace when compared to the total length of the body.

Ifasya madagascariensis (Van Straelen, 1933)
Figs. 8, 9, 17, 18, 19, 20, 21

1933 - *Antrimpos madagascariensis* - Van Straelen, p. 1- 2, figs. 1, 2

Holotype: R05490 (MNHN, Paris).
Paratype: not found.

Diagnosis. Subrectangular carapace; long rostrum with subrostral median tooth; strong dorsal hump at the base of the rostrum; spine in the posterior third of the dorsal midline of the carapace; deep hepatic groove and weak branchiocardiac groove; gastro-orbital, hepatic and branchiocardiac spines present; pereiopods I-III chelate; strongly elongate pereiopod III; tergite VI rectangular; triangular telson with a pointed distal extremity.

Material. 180 specimens, in a different state of preservation, were found in different outcrops; Ambarakaraka (9); Bobasatrana (145); Antanambo (22); Mamoro (3). One specimen lacks the place of origin.

As already stated, the abundant material allowed us to carry out a more detailed description of this species compared to the one carried out by Van Straelen (1933) which was based on two badly preserved specimens only.

The description of the species is based mainly on the following specimens: MSNM i9314, i9328, i9383, i9385, i9406, i9408, i9413, i9466, i11220, i11243, i11254, i11267, i11270, i11304, i11308.

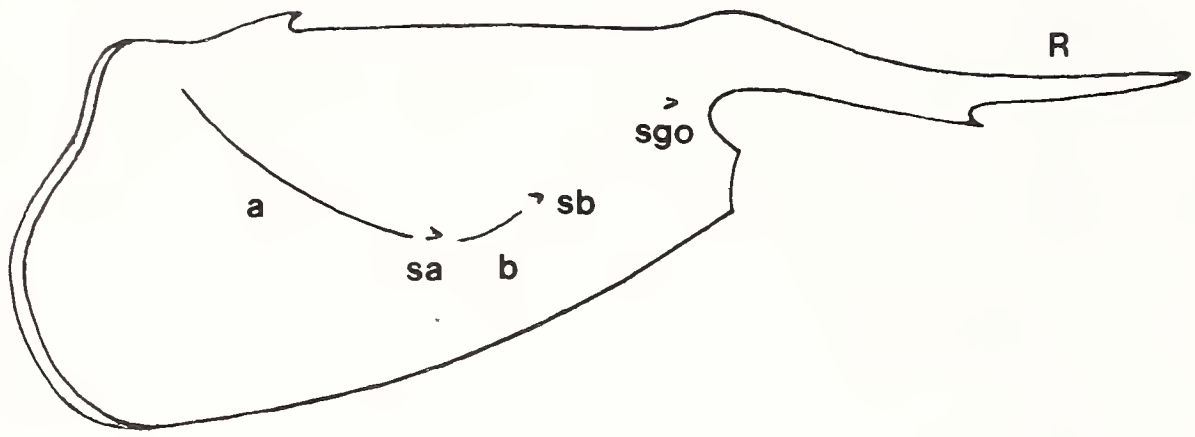

Fig. 8 – *Ifasya madagascariensis* (Van Straelen, 1933), carapace reconstruction, line drawing.

Description. Small elongate penaeid, with a thin finely tuberculate carapace, 2 to 6.5 cm in length.

Carapace. The carapace (Fig. 8), in lateral view, is subrectangular in outline, with the ventral margin rising slightly in the anterior third. The dorsal margin has a straight trend and the posterior third has a forward projecting strong spine. The dorsal margin extends into a long, thin rostrum with pointed distal extremity and bearing a subrostral median tooth. At the base of the rostrum a marked dorsal hump is evident. The posterior margin, slightly convex in the lower third, is strengthened by a thin marginal carina. The ventral margin has a curvilinear trend. The ocular incision is narrow and shallow. Weak antennal and pterigostomial angles are present. On the carapace there are the deep hepatic groove, the weak branchiocardiac groove and the gastro-orbital, hepatic and branchiocardiac spines.

Abdomen. It is well preserved in all the specimens. Tergites I-V are subrectangular in outline and increasing in length. The posterior margin of tergites I-III is straight, while that of tergite IV-V is posteriorly projecting. The dorsal margin of tergites IV-V has a strong posteriorly projecting median spine. Tergite VI is strongly elongate, its length is twice as much as the height, with a thin carina running near the ventral margin. The telson is triangular in outline bearing a pointed distal extremity, and its length equals that of tergite VI. The length of the uropods, usually badly preserved, are 1/3 longer than the telson. The exopodite is strengthened by two thin longitudinal lateral carinae and has a subrectangular protopodite. The endopodite has no characteristic ornamentation.

Cephalic appendages. These are partly preserved in some specimens. The eye penducle is thin and elongate. It was possible to observe only the 2nd and 3rd stalk of the peduncle and fragments of the flagella of the antennulae. The scaphocerite comprises a large lamina rounded at the distal extremity and bearing a spine as external margin. The scaphocerite is articulated to a rectangular basicerite. The carpocerite has a thin flagellum which total length is not evident.

Thoracic appendages. While the pereiopods are partly preserved in some specimens, it was never possible to observe the 3rd maxilliped. Pereio-

pod III is the only one that can be easily identified, because of its typical proportions, facilitating its identification. Propodus is the only one of the four articula that is easily observed, it is well developed, strong with thin dactylus and index, slightly bent at the distal extremity.

Abdominal appendages. The pleopods are preserved only in few specimens. Each pleopod comprises a subrectangular sympodite crossed by two thin central carinae to which two short flagella are articulated.

Discussion. Until not very long ago many Triassic species were gathered in the genus *Antrimpos* Münster, 1839: *A. madagascariensis* Van Straelen, 1933, from Lower Triassic of Madagascar; *A. atavus* Bill, 1914, from Upper Bundsanstein of Vosges (France); *A. crassipes* Bronn, 1858 from Carnian of Raibl (Austria); *A. juvavensis* Van Straelen, 1940, from Keuper of Salzachtal (Austria); *A. noricus* Pinna, 1974, from Norian of Lombard Prealps (for a short discussion about the status of the genus *Antrimpos* see Garassino & Teruzzi (1993), p. 7).

The abundant sample at our disposal allow us to think that the attribution of the species *A. madagascariensis* Van Straelen, 1933 to the genus *Antrimpos* Münster, 1839 is not valid, because it doesn't show the typical morphological features of this genus. Van Straelen himself, on the other hand, ascribed the Malagasy forms to the genus *Antrimpos* Münster, 1839 with some doubts (Van Straelen (1933), p. 2). The genus *Antrimpos* was created by Münster (1839) on the species *A. speciosus,* from the Tithonian of Solnhofen, Southern Germany. Van Straelen (1925) described the main features of

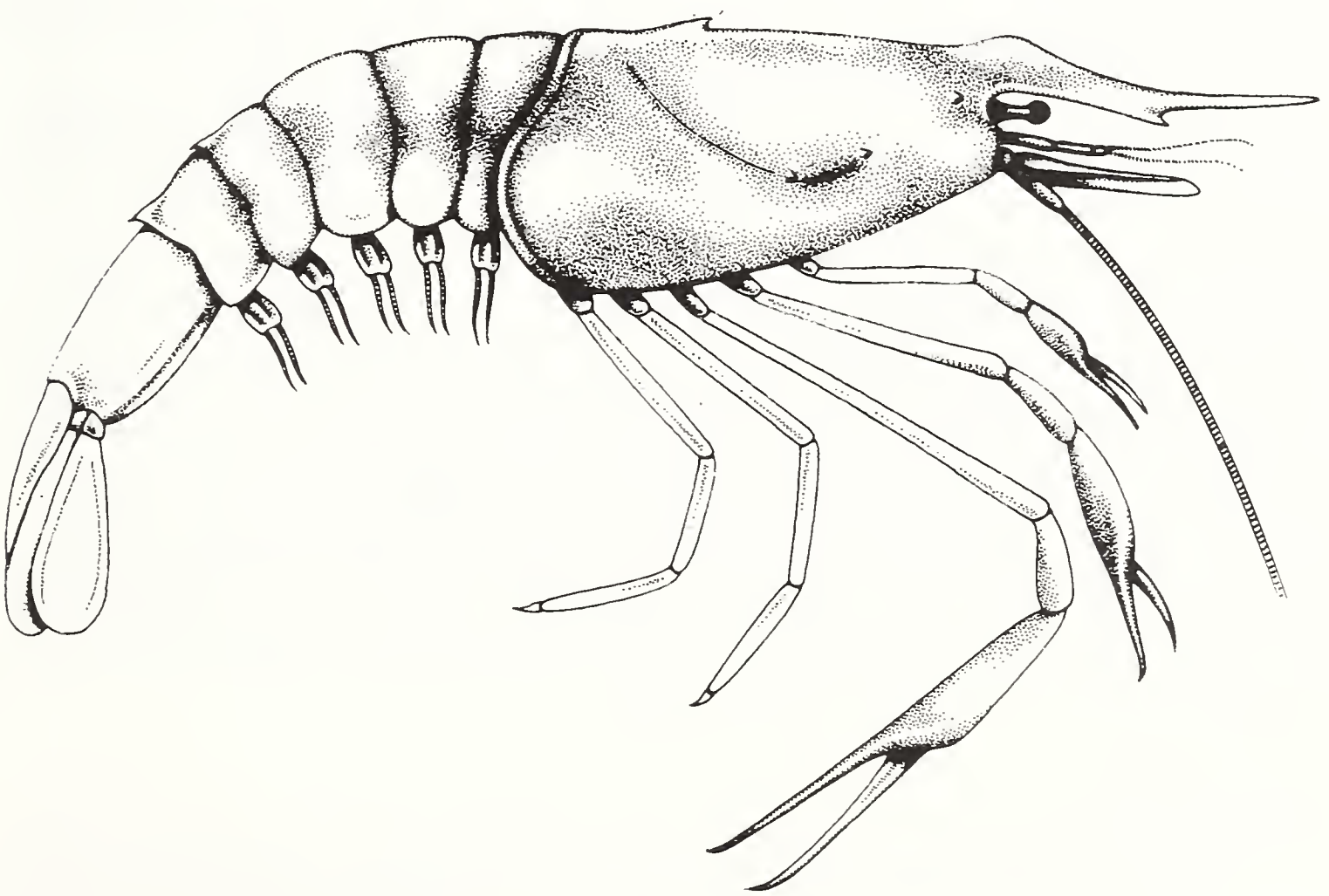

Fig. 9 – *Ifasya madagascariensis* (Van Straelen, 1933), reconstruction.

this genus: a more or less elongate carapace supplied with a rostrum often toothed on both margins, antennulae with two flagella of different length, antennae longer than the antennulae and twice as long as the body, pereiopods I-III chelate. Glaessner (1969) added to these features the increasing length of pereiopods I-III, and tergite VI longer than the previous ones. As other authors before him, Glaessner (1969) stressed that genus *Antrimpos* Münster, 1839 was actually a «collective» genus, to which many species of fossil penaeids that were not strictly related to present penaeids were assigned. On the basis of the previous works Pinna (1974) summarized the typical morphological features of the genus:

1 - acute antennal angle
2 - weak but sharp pterigostomial angle
3 - presence of a strong antennal spine
4 - weak hepatic, orbito-antennal and gastro-frontal grooves
5 - developed rostrum with or without subrostral teeth
6 - antennulae with elongate peduncle and two short flagella of different thickness
7 - antennae with well developed scaphocerite
8 - well developed pereiopod III, due to the elongation of merus and carpus
9 - small pereiopods IV-V with a terminal dactylus
10 - abdominal tergites with rounded pleurae
11 - pointed triangular telson crossed by a groove
12 - exopodite of the uropodite with a diaeresis
13 - well developed pleopods

In the Triassic and Jurassic species known from the palaeontological literature it is possible to find the above mentioned features, more or less evident according to the preservation modalities of the specimens. Their attribution is therefore justified.

The description of *A. madagascariensis* Van Straelen, 1933 is necessarily less detailed than ours, because of the poor sample at his disposal. At the Museum National d'Histoire Naturelle of Paris it was possible to find only the counter-part of the type of *A. madagascariensis* Van Straelen, 1933, not illustrated by the author. The comparison between our specimens and the counter-part leaves no doubts on the attribution of our specimens to Van Straelen's species. There are in fact many analogies: general shape of the body; subrectangular carapace; rostrum with subrostral median tooth; marked dorsal hump at the base of the rostrum; anterior margin of tergite II not covering the posterior margin of tergite I. Some of these features are different to those belonging to the genus *Antrimpos* Münster, 1839 and therefore the specimens studied by Van Straelen (1933) don't belong to the Münster's genus, but they must be ascribed to the new genus *Ifasya* and to the species *I. madagascariensis* (Van Straelen, 1933).

Conclusions

The high number of specimens at our disposal allowed to better clarify the composition of the most ancient decapod crustacean fossil assemblage known to date. In fact, the attribution of *Palaeopalaemon newberreyi* Whitfield, 1880 to decapod crustaceans (Schram, Feldmann & Copeland

(1978)) is still doubtful (Felgenhauer & Abele (1983)). *Protoclytiopsis antiqua* Birsthein, 1958, an erymid of the Upper Permian of Siberia, is known just for one single specimen, consisting of the carapace alone. The decapod crustacean fauna of Madagascar comprises exclusively specimens belonging to the infraorder Penaeidea de Haan, 1849, and characterized by bulky thoracic appendages: particularly the chelae of pereiopods I-III are very developed if compared to those of present penaeids, and pereiopods IV-V are not very long if compared to the preceeding ones. Moreover the pleopods have rather short flagella. All this led us to think that these forms are not fit for swimming, but quite suited for an epibenthic life-style. The habitat had to be clearly marine, due to the presence of ammonites, polychaete annelids and thylacocephalan crustaceans, as well as marine fishes (coelacanths and actinopterygians); the emerged lands should not be located very far away, because of the presence of stegocephalian amphibians and land plants. But the composition of the fauna does not seem to be homogeneous within the sedimentary basin of the Ambilobé region. In the most south-western fossiliferous area (Ankitokazo, Mamoro, Ambarakaraka, Anaborano) the ammonites are very rare and small sized, and it is possible to find, together with decapod crustaceans, shallow-water and muddy-bottom invertebrates such as thylacocephalan crustaceans. More NW, on the contrary, in the Bobasatrana area, there is plenty of ammonites, even small ones. We could draw the conclusion that such different distribution of the fauna is due to the differences in the depth of the basin, with a more clearly pelagic environment in the north-western areas. Recently, Barbieri et alii (1993) remarked similar differences in the distribution of fishes taxa in the same outcrops, and stated that they were to be attributed to different depths of the different parts of the basin. Anyhow, despite the difference in the ammonite distribution, the decapods found in the area between Anaborano and Bobasatrana did not seem to be affected, since their taxonomic diversity doesn't substantially change in the different outcrops, and also their relative abundance — if compared to the rest of the invertebrate macrofauna — by a geographic gradient.

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Fig. 10 – *Ifasya straeleni* n.sp., holotype, n.cat. MSNM i9421a, photo and reconstruction (× 2.7).

Fig. 11 – *Ifasya straeleni* n.sp., n.cat. MSNM i9317b, photo and reconstruction (× 2.7).

Fig. 12 – *Ifasya straeleni* n.sp., n.cat. MSNM i9460b, photo and reconstruction (× 3.7).

Fig. 13 – *Ifasya straeleni* n.sp., n.cat. MSNM i11141a, photo and reconstruction (× 3).

Fig. 14 – *Ifasya straeleni* n.sp., n.cat. MSNM i11203, photo and reconstruction (× 4.5).

Fig. 15 – *Ifasya straeleni* n.sp., n.cat. MSNM i8463a, photo and reconstruction (× 1.8).

Fig. 16 – *Ifasya straeleni* n.sp., n.cat. MSNM i11114a, photo and reconstruction (× 5.8).

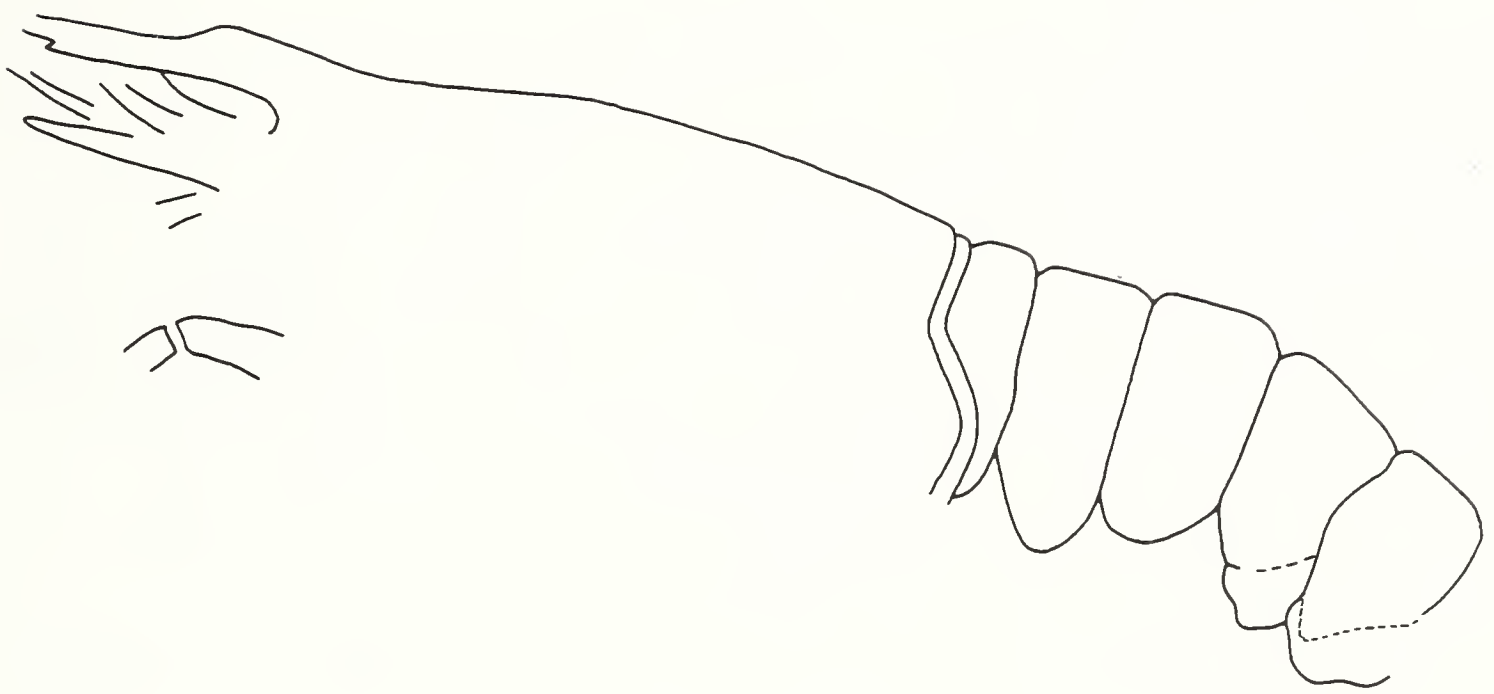

Fig. 17 – *Ifasya madagascariensis* (Van Straelen, 1933), holotype, R05490, photo and reconstruction (× 3).

Fig. 18 – *Ifasya madagascariensis* (Van Straelen, 1933), n.cat. MSNM i9328a, photo and reconstruction (× 2.4).

Fig. 19 – *Ifasya madagascariensis* (Van Straelen, 1933), n.cat. MSNM i11243b, photo and reconstruction (× 2).

Fig. 20 — *Ifasya madagascariensis* (Van Straelen, 1933), n.cat. MSNM i9406a, photo and reconstruction (× 3).

Fig. 21 — *Ifasya madagascariensis* (Van Straelen, 1933), n.cat. MSNM i9383a, photo and reconstruction (× 3.1).

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